Serial Number: 10/010,524

Filing Date: December 7, 2001

Title: ENABLING SPARSE REFRESH TECHNIQUES WITH CACHE-LIKE STRUCTURES THAT SNOOP FRAME BUFFER WRITES

Assignee: Intel Corporation

## **IN THE CLAIMS**

Please amend the claims as follows.

1. (Previously Presented) A method, comprising:

detecting a write command to a frame buffer;

determining a region in the frame buffer associated with a frame buffer address in the write command, wherein the region spans more than one row of pixels and wherein a shape of the region is configurable; and

determining whether the region is the same as a last-modified region for purposes of deciding whether to asynchronously send the region to a display device.

2. (Previously Presented) The method of claim 1, further comprising:

when the region is not the same as the last-modified region,

asynchronously sending the region to the display device associated with the frame buffer, and

setting the last-modified region to be the region.

3. (Original) The method of claim 1, further comprising:

when the region is the same as the last-modified region, refraining from sending the region to the display device until a different region is detected.

- 4. (Original) The method of claim 1, wherein the write command is issued by a graphics engine to the frame buffer.
- 5. (Previously Presented) The method of claim 1, wherein the frame buffer comprises a plurality of regions each representing a plurality of pixels on the display device, and wherein the region is one of the plurality of regions.

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6. (Original) The method of claim 5, wherein the plurality of regions represent the plurality of pixels in a rectangular shape on the display device.

- 7. (Original) The method of claim 6, wherein each of the plurality of regions represents a same number of pixels.
- 8. (Original) The method of claim 4, wherein the detecting is carried out by logic connected to the frame buffer and the graphics engine.
- 9. (Previously Presented) An apparatus, comprising:a graphics engine to:

generate an asynchronous write command having an associated region in a frame buffer, wherein the region spans more than one row of pixels and wherein a shape of the region is configurable,

determine whether scan-out logic is accessing the associated region in the frame buffer, and

store the write command in memory associated with the graphics engine when the scan-out logic accesses the associated region in the frame buffer.

- 10. (Original) The apparatus of claim 9, wherein the graphics engine is further to: send the write command to the frame buffer when the scan-out logic is not accessing the associated region in the frame buffer.
- 11. (Original) The apparatus of claim 9, wherein the frame buffer comprises a plurality of regions each representing a plurality of pixels on a display device, and wherein the associated region is one of the plurality of regions.

Claims 12 - 14. (Canceled)

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(Previously Presented) A signal-bearing medium comprising instructions, which when 15. read and executed by a processor comprise:

accumulating writes by a graphics engine to one of a plurality of regions in a frame buffer, wherein the plurality of regions represent respective pixels on a display device which spans more than one row of pixels and shapes of the regions are configurable;

detecting that the graphics engine has written to another region of the plurality of regions in the frame buffer; and

in response to the detecting, causing the one region to be asynchronously written to the display device.

- 16. (Original) The signal-bearing medium of claim 15, wherein the detecting further comprises converting frame buffer addresses in the writes to region numbers.
- (Original) The signal-bearing medium of claim 15, wherein the causing further 17. comprises:

instructing scan-out logic to copy the one region from the frame buffer to the display device asynchronously from the writes to the frame buffer.

Claims 18 - 25. (Canceled)

26. (Previously Presented) An electronic device, comprising:

a graphics engine to, for every respective modified region in a set of candidate regions,

asynchronously copy the respective modified region from a frame buffer to a display,

when the respective modified region was written to during the copy, mark the respective modified region as modified, and

when the respective modified region was not written to during the copy, mark the respective modified region as not modified, wherein the modified and candidate regions span more than one row of pixels and have shapes which are configurable.

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AMENDMENT AND RESPONSE UNDER 37 C.F.R. 1.116 - EXPEDITED PROCEDURE

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27. (Original) The electronic device of claim 26, wherein the set of candidates comprises all regions that have not been written to during a most recent period of time.

- 28. (Original) The electronic device of claim 26, wherein the set of candidates comprises all regions except a number of most-recently written to regions.
- 29. (Original) The electronic device of claim 26, wherein the set of candidates comprises a number of least-recently written to regions.
- 30. (Original) The electronic device of claim 26, wherein the set of candidates comprises all regions being displaced from the frame buffer.